PREDICTING THE COMPRESSIVE STRENGTH OF CONCRETE

A PROJECT DOCUMENT

1. <u>Introduction</u>

1.1 <u>Overview</u>

This project is about predicting the compressive strength of concrete. Now-a-days role of concrete plays a major role in our daily life. Because, concrete is used in buildings, dams, bridges, cement roads etc. So, in order to increase the life of a building, the major thing we need to consider is quality of concrete. The quality of concrete is achieved by calculating the compressive strength of concrete. So, this project builds a machine learning model using dataset, which is used to predict the compressive strength of concrete.

1.2 <u>Purpose</u>

As mentioned in overview of this project, the purpose is to predict the compressive strength of concrete. It calculates the compressive strength using the quantity of cement, flyash, slag, water etc. If we give the quantity of all ingredients which we are going to include in concrete, the machine learning model gives us the predicted compressive strength.

## 2. <u>Literature survey</u>

2.1 <u>Existing problem</u>

There is a method to find the compressive strength of a concrete. It can be found by standard crushing test performed on concrete cylinder. But the problem with this method is to find strength, it takes 28 days.

2.2 <u>Proposed solution</u>

So, the traditional method takes a lot of time. So, to remove this problem, we are developing a machine learning model to predict the compressive strength of a concrete. It predicts the compressive strength in seconds.

3. THEORITICAL ANALYSIS

3.1 Block diagram

```
┌─────────────────────────────┐
│           Dataset           │
└─────────────────────────────┘
               │
               ▼
┌─────────────────────────────┐
│       Reading the data      │
└─────────────────────────────┘
               │
               ▼
┌─────────────────────────────┐
│      Handling null values   │
└─────────────────────────────┘
               │
               ▼
┌─────────────────────────────┐
│   Applying data visualization│
│   techniques like Pair plot, │
│       Correlation plot.      │
└─────────────────────────────┘
               │
               ▼
┌─────────────────────────────┐
│     Dividing dependent and  │
│     independent variables   │
└─────────────────────────────┘
               │
               ▼
┌─────────────────────────────┐
│       Splitting the data    │
└─────────────────────────────┘
               │
               ▼
┌─────────────────────────────┐
│        Feature Scaling      │
└─────────────────────────────┘
               │
               ▼
┌─────────────────────────────┐
│   Applying linear regression│
│             model           │
└─────────────────────────────┘
               │
               ▼
┌─────────────────────────────┐
│    Achieving the predicted  │
│     compressive strength    │
└─────────────────────────────┘
```
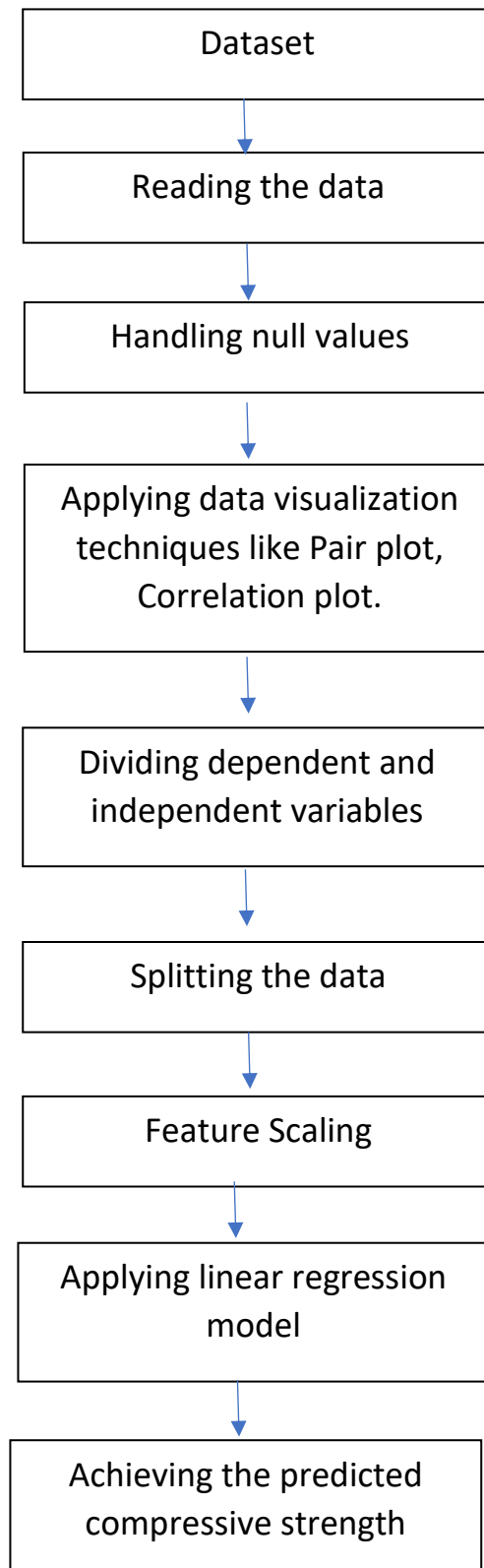
3.2 <u>Hardware / Software requirements</u>

Hardware requirements

a. A personal computer or a laptop.
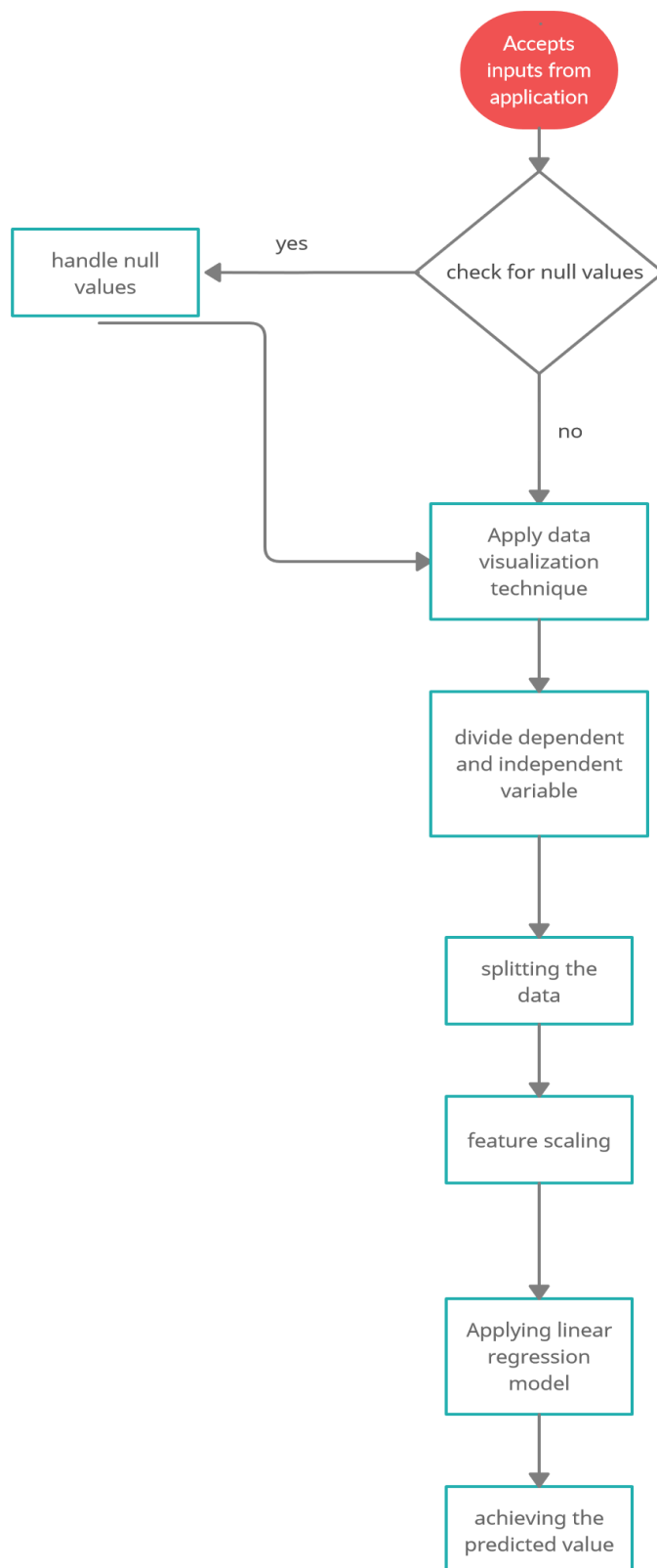b. A mobile phone.

Software requirements

a. Jupitor (in anaconda navigator)
b. Spyder (in anaconda navigator)
c. Internet
d. Dataset
e. Anaconda prompt

4. <u>Experimental investigations</u>

We made investigations on solution whether the machine learning model is predicting the correct value or not. So, in order to find the predicted value is correct or not, we have given the values of ingredients which are already present in the dataset. It gave the nearest value.

Also we have compared the predicted values with the original values with the code. The values are similar.

5. **Flow chart**

Accepts inputs from application

check for null values

yes

handle null values

no

Apply data visualization technique

divide dependent and independent variable

splitting the data

feature scaling

Applying linear regression model

achieving the predicted value

6. Result

result

7. Advantages & Disadvantages

Advantages

- Less cost
- Simple to use
- Technical knowledge is not required, in order to find strength
- It takes less time to predict the strength
- It can be applicable in all the areas

Disadvantages

- It gives the similar value, but not accurate value.
- Sometimes the model may give inaccurate solution as it deals with the past data

8. Applications

Any area where the concrete is used like buildings, dams bridges, etc. this method can be used. It is applicable every area, where the requirement is compressive strength is required.

9. Conclusion

After the completion of this project, we can conclude that, we can achieve the predicted compressive strength of concrete by using the quantity of ingredients which are used in making of concrete. If we give the quantity of cement, water, fly ash, slag, age, coarse aggregate, fine aggregate, and super plasticizer we can predict the value of compressive strength using a machine learning model.

10.   Future scope

Day by day the use of concrete is increasing as the construction are required to build houses, roads, dams etc. All the sectors are using the machine learning models to find solution with less time. So, in order to complete the works faster, this machine learning model will play a major role in finding the compressive strength of concrete with less time as the traditional method takes the larger time. So, this method will replace the traditional method.

11.   Bibilography

- Kaggle website is used to download the dataset.
- Analytics Vidhya website is used for machine learning model code reference.
- SmartInternz youtube channel and other youtube channels are used to build flask application.